

RHIPICEPHALUS BURSA IN ISRAEL

B. FELDMAN-MUHSAM

Department of Parasitology, The Hebrew University of Jerusalem

Rhipicephalus bursa Canestrini and Fanzago 1877 is a Mediterranean species which has overflowed into Southern Europe. It has been found in the Mediterranean basin and also in Rumania (Metianu 1951) and has spread to Southern USSR (Olenev 1931, Yakimoff 1923) probably through Rumania and Turkey. In Africa it has spread southward into Kenya (Lewis 1931). In Algiers it is the most prevalent tick, and Ed. Sergent et al. (1945) found it to represent 44.4% of the tick fauna there. Metianu in Rumania found it to represent only 0.5% of the tick population.

R. bursa is a species involved in the transmission of different diseases to animals, and a correct identification is therefore of a paramount importance. It has been demonstrated to transmit *Anaplasma marginale* and *Piroplasma bigeminum* in cattle, *Babesiella motasi* and *P. ovis* to sheep. Experimentally it has transmitted also *P. caballi* to a horse (Enigk 1943). The species is not very common in Israel, and among ca. 2800 adult specimens of *Rhipicephalus* sp. examined from different hosts, only ca. 30 were *R. bursa* (ca. 1%).

The main hosts of *R. bursa* in Israel in the preimaginal stages as well as the imaginal stages are sheep and goats. A few ticks, in the imaginal and preimaginal stages, were found on cattle and mules.

The larvae and nymphs were found to feed normally on sheep and goats in Israel. They attach themselves to the deepest parts of the ear, sometimes as far as the tympanum. Exceptionally some nymphs were found feeding on the udder of a cow.

It is interesting to note that Pavlovskii and Pomeranzev (1934) found that sheep, cattle and horses are the hosts of the adults, and that the larvae and nymphs do not feed on sheep. Daubney and Hudson (1934), carrying out transmission experiments with Nairobi sheep disease also did not succeed in inducing larvae to feed on the ears of sheep. Partially fed larvae and nymphs removed by us from the ears of sheep and goats, were fed in the laboratory on rats, and unengorged and partially engorged nymphs were fed on rats and *Meriones tristrami*. We did not succeed in feeding larvae hatched in the laboratory on *Meriones tristrami*.

During December—March larvae and nymphs were found feeding in the external ear canal of sheep and goats. The few adults which we have been able to take off hosts were taken in the beginning of the summer during May—June (1 engorged female in October on a mule).

The great individual variability within the species of the genus *Rhipicephalus* has been observed and studied by Nuttall (1913) in *R. appendiculatus* and by Cunliffe in *R. pulchellus*, (1913) and *R. sanguineus* (1914). Zumpt (1942) has studied the variation in the adults of *R. bursa* and has shown the great variability of the offspring of one female, in size,

punctuation, form of anal plates and shape of stigma. Nuttall and Cunliffe ascribed the variations to interference by the host and detaching of larvae and nymphs before the completion of feeding. Zumpt has shown that the small specimens are not necessarily the issues of nymphs which had been taken off the host before completing their feed. He has also obtained small imagines from normal sized nymphs.

The variations in *R. bursa* appear not only in adults and nymphs with an incomplete feed during the previous stage. As will be shown later, marked variations are found in the scutum of the larvae.

LARVA

Body oval; ca. 0.5 mm in length. Alloscutum with 9 festoons (Figure 1,C). Scutum wider than it is long. The length of the scutum is very variable. The ratio of length to width varies considerably; values as different as e.g. 4/6 and 5/6 have been observed (Figure 2). The mean length of the scutum is about 0.29 mm. The basis capituli is rectangular and has no lateral angles (Figure 1). By this last character the larva is easily distinguished from that of *R. sanguineus* Lat. 1806 or *R. secundus* Fel, Muh. 1952. The palps are short and large, dentition of the hypostome is 2/2, 6—7 teeth per file. There are only hints of spurs on the coxae.

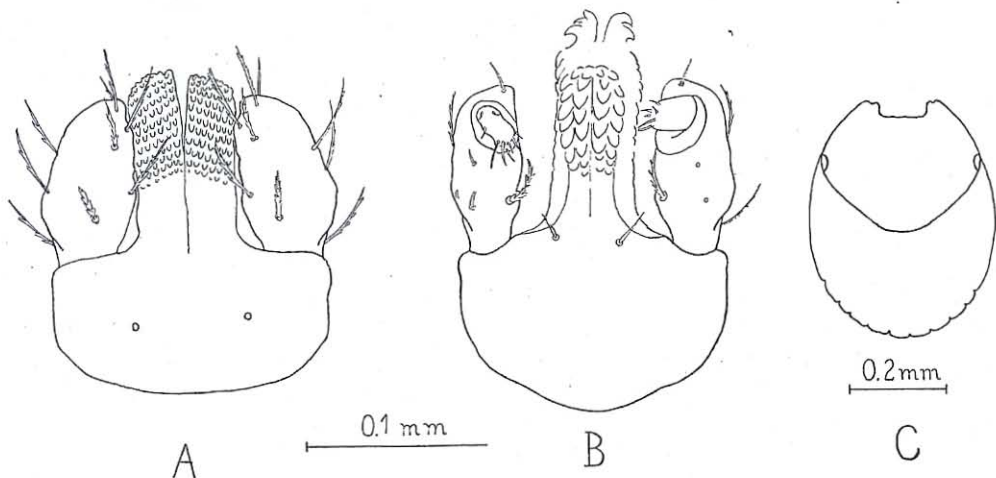


Figure 1

Larva. A—Capitulum, dorsum, B—Capitulum, venter. C—Body.

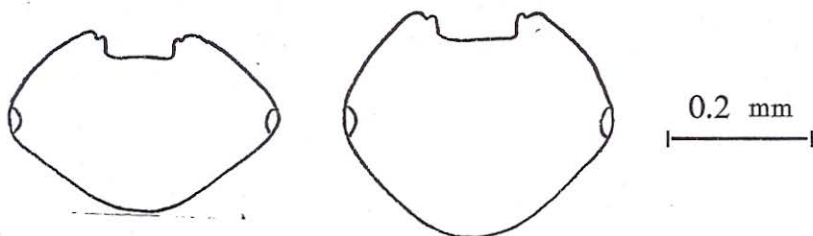


Figure 2

Scutums of two larvae, offspring of the same female.

It should be pointed out that the length of the scutum is very variable, even among the offspring of one female. In one case a coefficient of variation of 6.8 ± 1.1 [(100 standard deviation/mean) \pm standard error] has been observed, the length of scutum varying from 0.238 mm to 0.313 among 19 larvae. Though variation is not always so extreme, among 24 offspring of another female the shortest scutum measured 0.270 mm and the longest 0.302 mm, the coefficient of variation being only 2.85 ± 0.41 . It might be mentioned that in the genus *Hyalomma*, where also a large range of variation in different characters exists in adults (Delpy 1936, Adler and Feldman-Muhsam 1948), such a variability has not been encountered in the larvae (Feldman-Muhsam 1948). Among the offspring of two females of *H. excavatum* coefficients of variation in the length of the scutum were 2.8 ± 0.5 and 2.7 ± 0.6 . In *H. dromedarii* it was found to be 2.5 ± 0.4 .

NYMPH

The nymph is easily distinguished from that of *R. sanguineus* or *R. secundus* by the form of the capitulum. The body is oval, about 1.4×0.9 mm. Its colour is pale yellow, it is very poorly chitinized. The scutum is generally wider than it is long, but its length is very variable.

The basis capituli has very blunt lateral angles. The palps are large (Figure 3). The first article of the palp bears ventrally a short branched hair. The legs are stout (Figure 6). Coxa I with two long spurs. Coxae II, III and IV with one spur (Figure 4).

The stigma is rounded without a tail and contains many small elements (Figure 5). The gorged nymph may reach more than 4 mm in length. Its colour varies from yellow to red-brown.

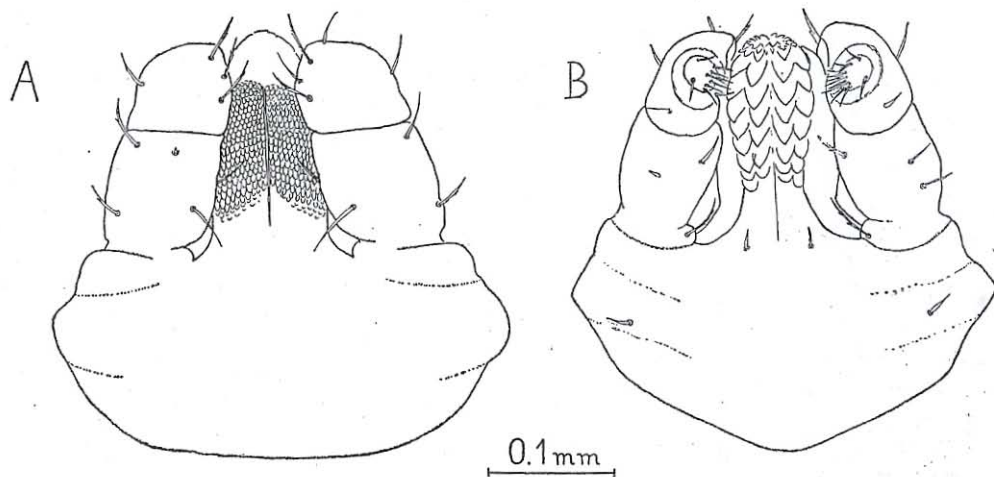


Figure 3

Nymph. A—Capitulum, dorsum. B—Capitulum, venter.

MALE

The form of the scutum is a large oval. The colour of the scutum is generally red-brown. It is covered with large punctation. The lateral grooves are long and conspicuous; sometimes they include one festoon. There are 11 festoons. The cervical grooves are

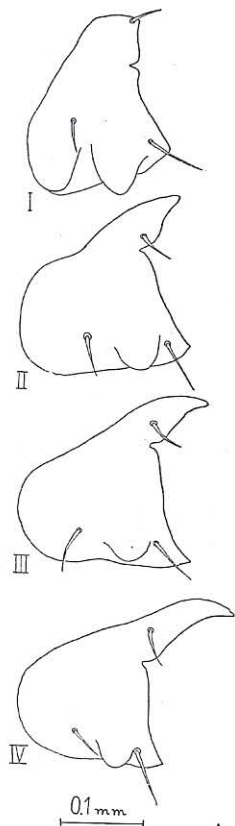


Figure 4
Nymph. Coxae I, II, III,
& IV.

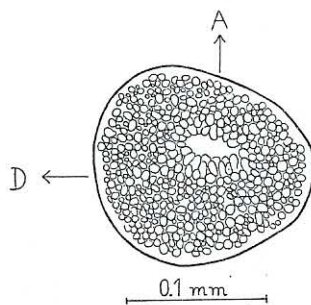


Figure 5
Nymph. Stigma.

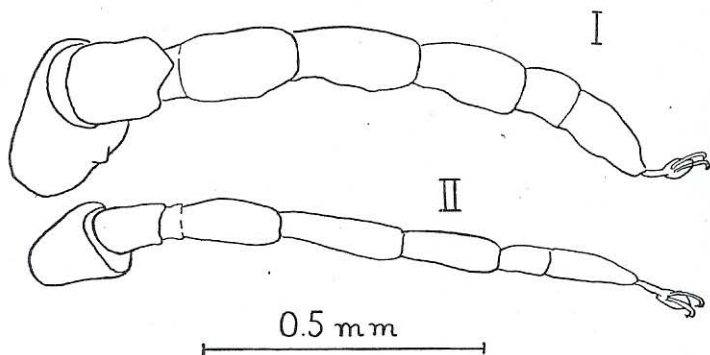


Figure 6
Fourth leg of nymphs of *R. bursa* (I) and *R. sanguineus* (II).

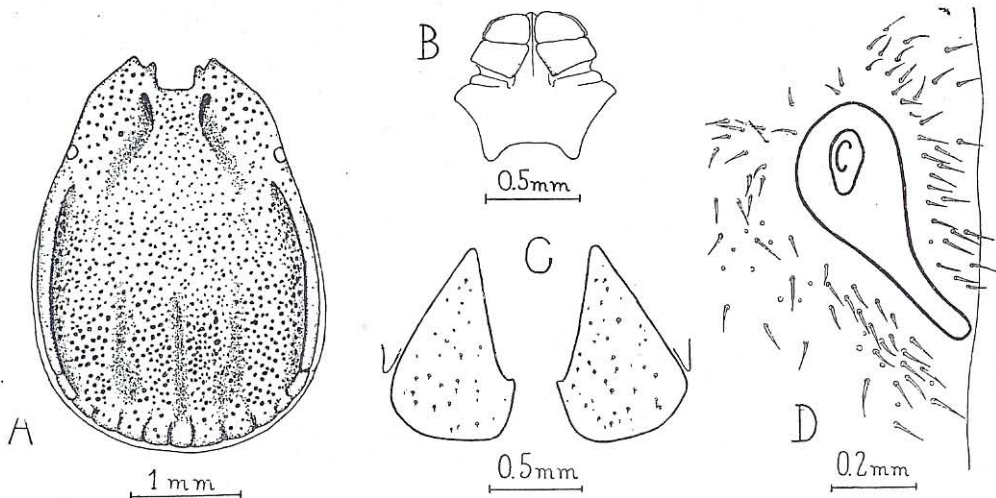


Figure 7
Male. A—Scutum. B—Capitulum, dorsum. C—Anal plates. D—Stigma.

narrow and reach a little behind the eyes (Figure 7,A). The eyes are more rounded and less flat than in *R. sanguineus*.

The basis capituli is 1.5 times wider than it is long and has well pointed lateral angles as in the other species of *Rhipicephalus*. Cornua long and well developed (Figure 7,B). The palps are large and short.

The stigma has a short and narrow tail (Figure 7,D). It is surrounded with hairs and is easily distinguished by this character from many other species of *Rhipicephalus*. (Similar peristigmal hairs are present in *R. evertsi*).

The anal plates are very characteristic. They are large and have a triangular shape with small and pointed prominences on their internal aspect. The adanal plates are small and pointed (Figure 7,C). The whole ventral tegument is very pilose, especially between the coxae. Coxa I is deeply bifid; coxae II and III with one spur. Coxa IV with two spurs.

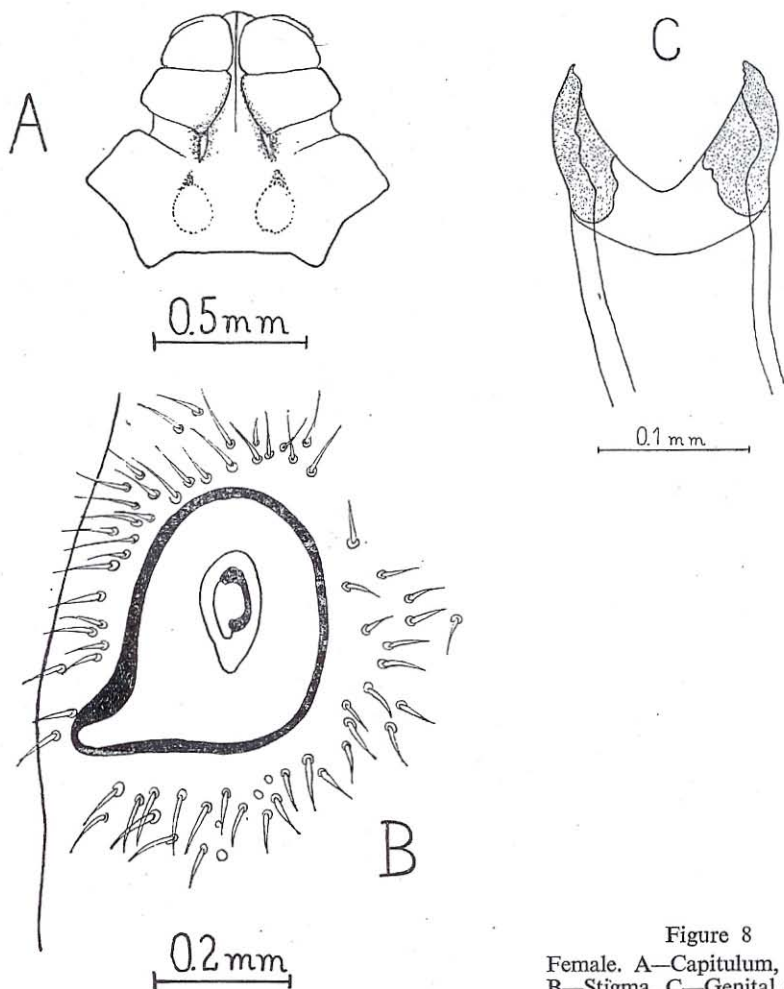


Figure 8
Female. A—Capitulum, dorsum,
B—Stigma, C—Genital aperture.

FEMALE

The colour of the tick is light red-brown. The colour of the legs is somewhat lighter than that of the scutum. The length and form of the scutum as well as its punctuation are variable. There are specimens where the length of the scutum equals its width and others where the scutum is wider than it is long. The punctuation might be coarser or finer. The eyes are as in the male. There are well formed cornua. The stigma (Figure 8) is surrounded with hairs as in the male. The external genital aperture when examined under the stereoscopic microscope has the form of a widely opened V with a rounded base. The cleared and mounted genital aperture (Figure 8,C) has the form of a widely open cup. The two flaps on the sides are more chitinized than the base. In specimens from North Africa, kindly sent by Prof. Ed. Sergent, the genital aperture showed the above characters.

REFERENCES

1. ADLER, S. and FELDMAN-MUHSAM, B., 1948, A note on the genus *Hyalomma* in Palestine, *Parasitology*, 39, 95.
 2. CUNLIFFE, N., 1913, The variability of *R. pulchellus*, *ibid.*, 6, 204.
 3. CUNLIFFE, N., 1914, *R. sanguineus*: Variation in size and structure due to nutrition, *ibid.*, 6, 372.
 4. DAUBNEY, R. and HUDSON, J. R., 1934, Nairobi sheep disease; Natural and experimental transmission by ticks other than *R. appendiculatus*, *ibid.*, 26, 496.
 5. DELPY L., 1936, Note sur les *Ixodides* du Genre *Hyalomma*, *Ann. de Parasit.*, 14, 206.
 6. ENIGK, K., 1943, Die Uebertraeger der Pferdpiroplasmose, ihre Verbreitung und Biologie, *Arch. wiss. prakt. Tierheilk.*, 78, 209.
 7. FELDMAN-MUHSAM, B., 1948, On larvae and nymphs of some species of Palestinian *Hyalomma*, *Parasitology*, 39, 138.
 8. FELDMAN-MUHSAM, B., 1952, On the identity of *R. sanguineus* Lat., *Bull. Res. Council of Israel*, 2, 187.
 9. LEWIS, A. E., 1931, A study of the ticks in Kenya Colony. The influence on natural conditions and other factors on their distribution and the incidence of tick-borne diseases, *Bull. Dept. Agric. Kenya*, No. 17.
 10. METIANU, T., 1951, Contribution a l'etude des *Ixodides* de Roumanie, *Ann. de Parasit.*, 26, 446.
 11. NUTTALL, G. H. F., 1913, *R. appendiculatus*: variation in size and structure due to nutrition, *Parasitology*, 4, 195.
 12. OLENEV, N. O., 1931, Die Zecken (*Ixodoidea*) der Fauna Russlands, *Z. Parasitenk.*, 4, 126.
 13. PAVLOVSKII, E. N. and POMERANZEV, B. I., 1934, Contribution to the question of the distribution of ticks in the zone of pastures on the western slope of Alagez. *Trans. Conn. Study industr. Resources, Ser. Transcaucas. Leningrad. Acad. Sci.* pt. 11, pp. 49-62.
 14. SERGENT, ED. et al., 1945, *Etudes sur les Piroplasmoses Bovines*, Institut Pasteur d'Algerie.
 15. YAKIMOFF, W. L., 1923, A propos des *Ixodides* de Russie, *Parasitology*, 15, 253.
 16. ZUMPT, F., 1942, Die Variationsbreite der Nachkommen eines Weibchens von *R. bursa*, *Z. Parasitenk.*, 12, 444.
-